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(54) Ventilated roof linings

(57) The lining (20) beneath the roofing panels (1) of a sloping roof has at least two base sheets (21, 27) arranged at a distance from one another with a ventilating sheet (3) located between them. The ventilating sheet (3) consists of a strip (4) of sheet material which, in the area of one or both longitudinal edges, carries a permanently attached band (7) of nonwoven, air permeable material. The band (7) of nonwoven material has a free ventilation cross-section of at least 80% of the band cross-section, and rests against a base sheet which overlaps with the ventilation sheet to define a vent between these sheets.

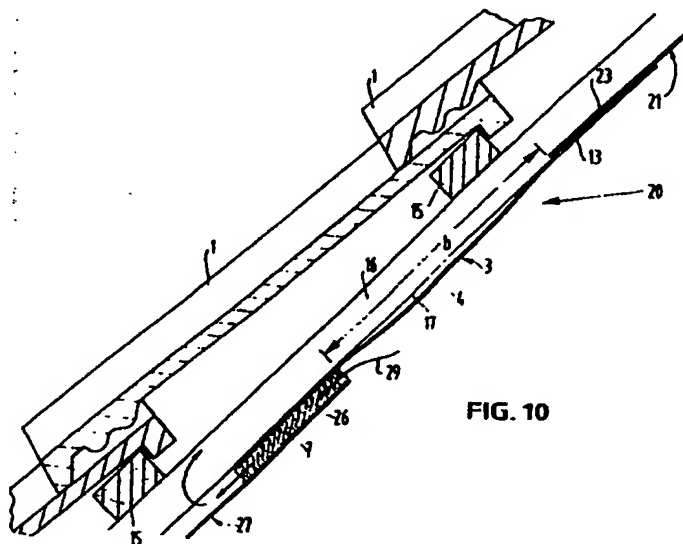


FIG. 10

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1

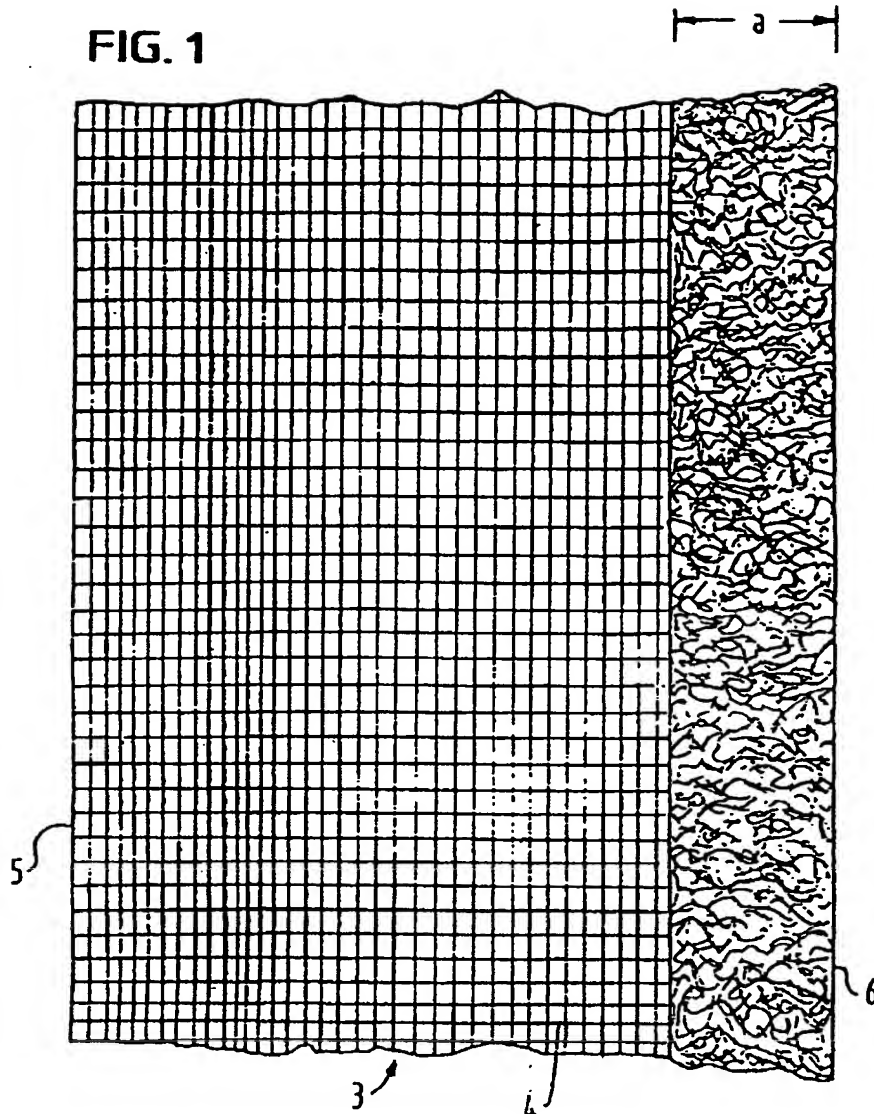


FIG. 2

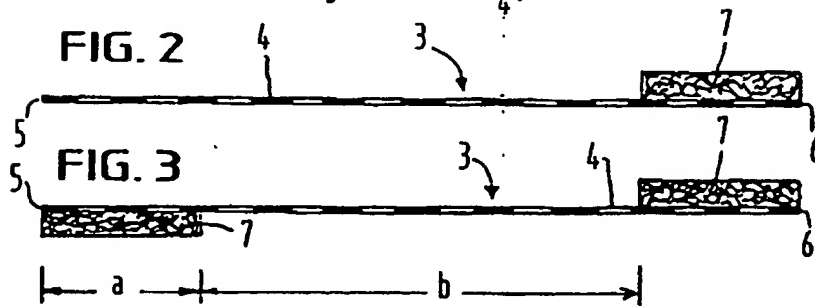


FIG. 3

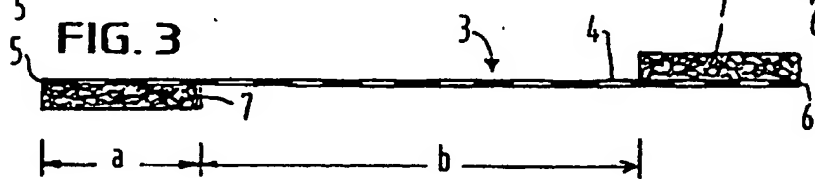


FIG. 4

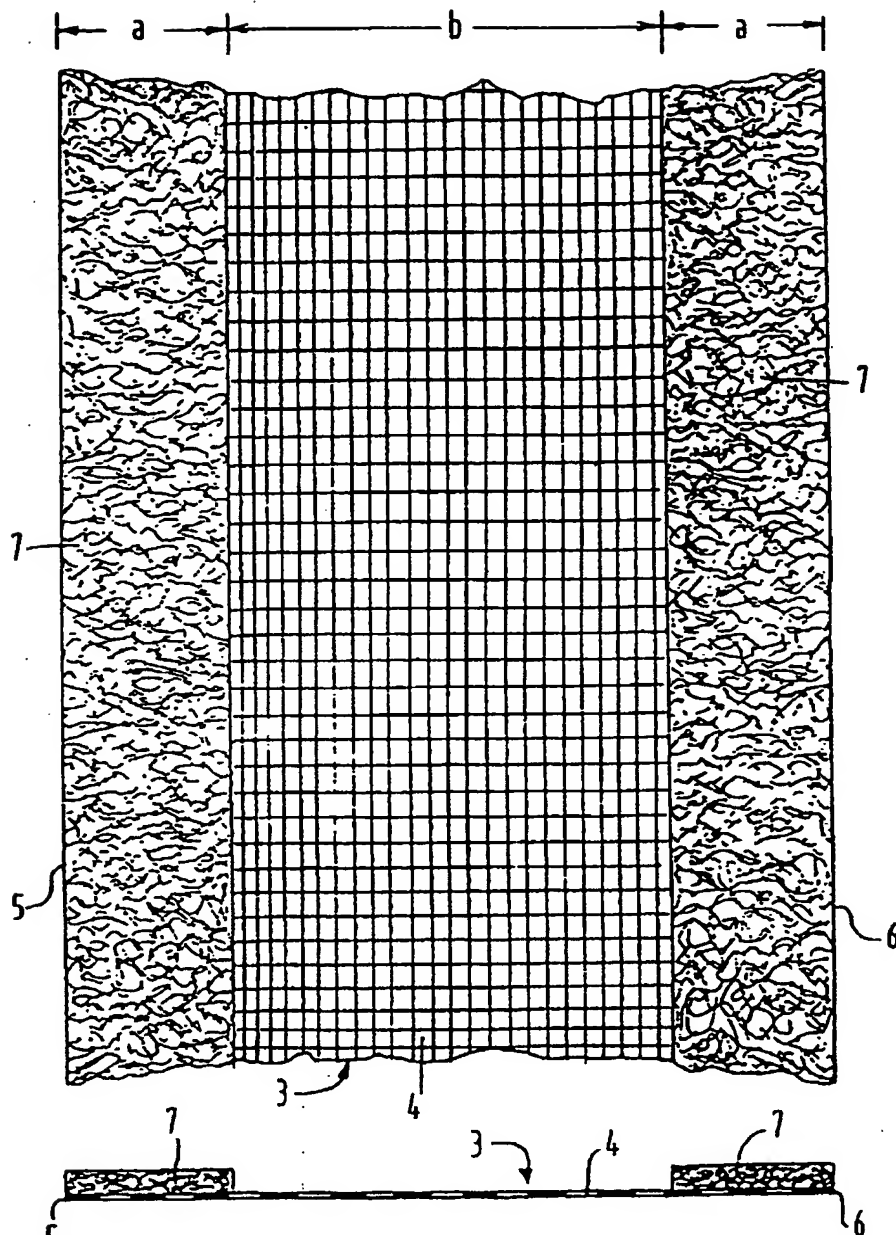
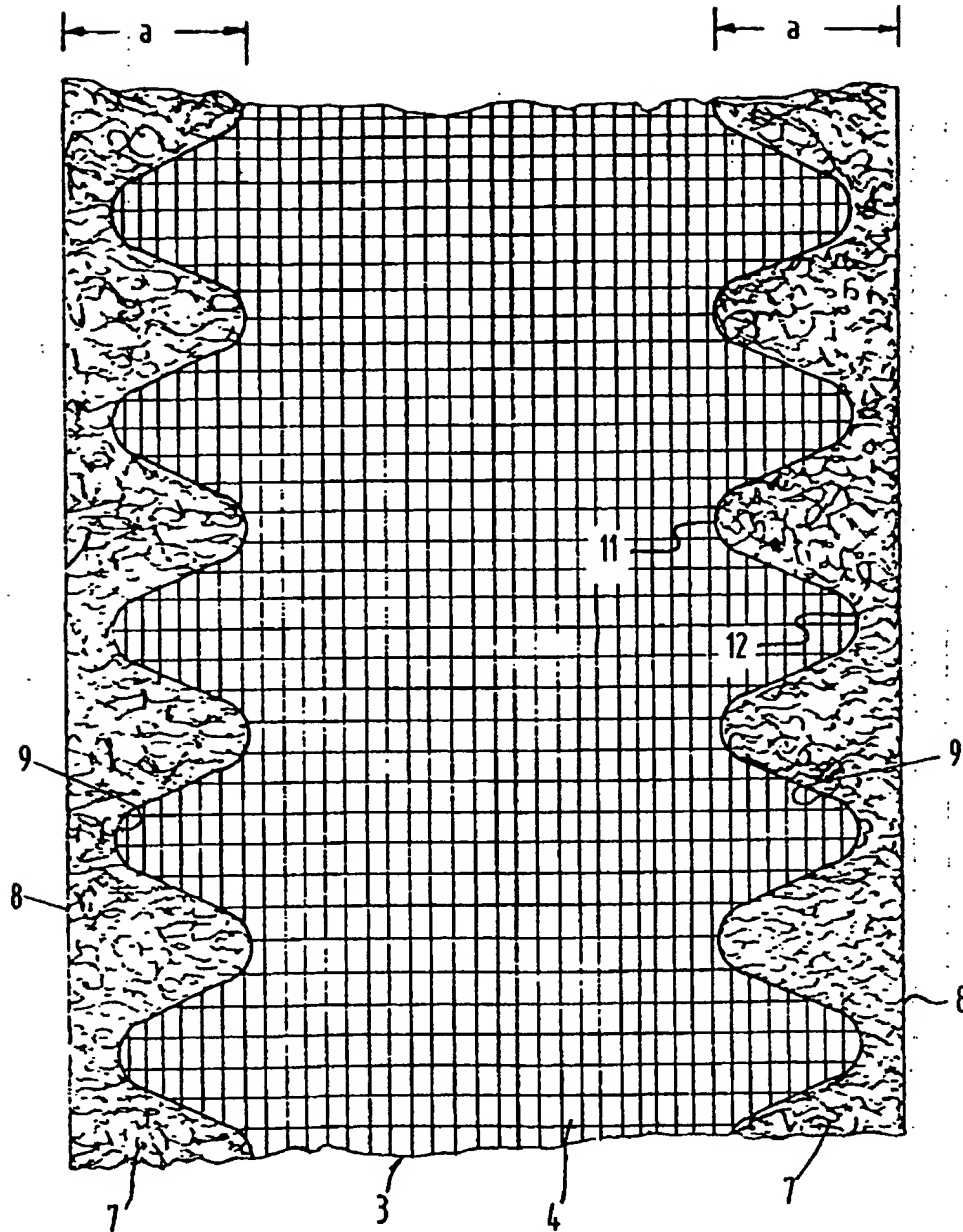


FIG. 5

FIG. 6



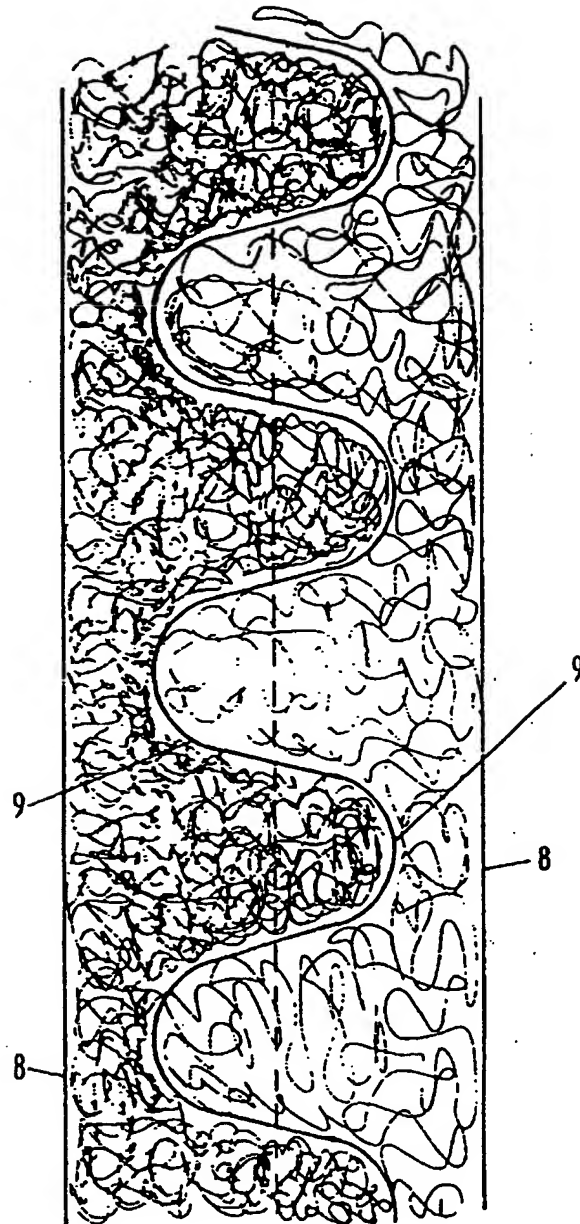


FIG. 7

FIG. 8

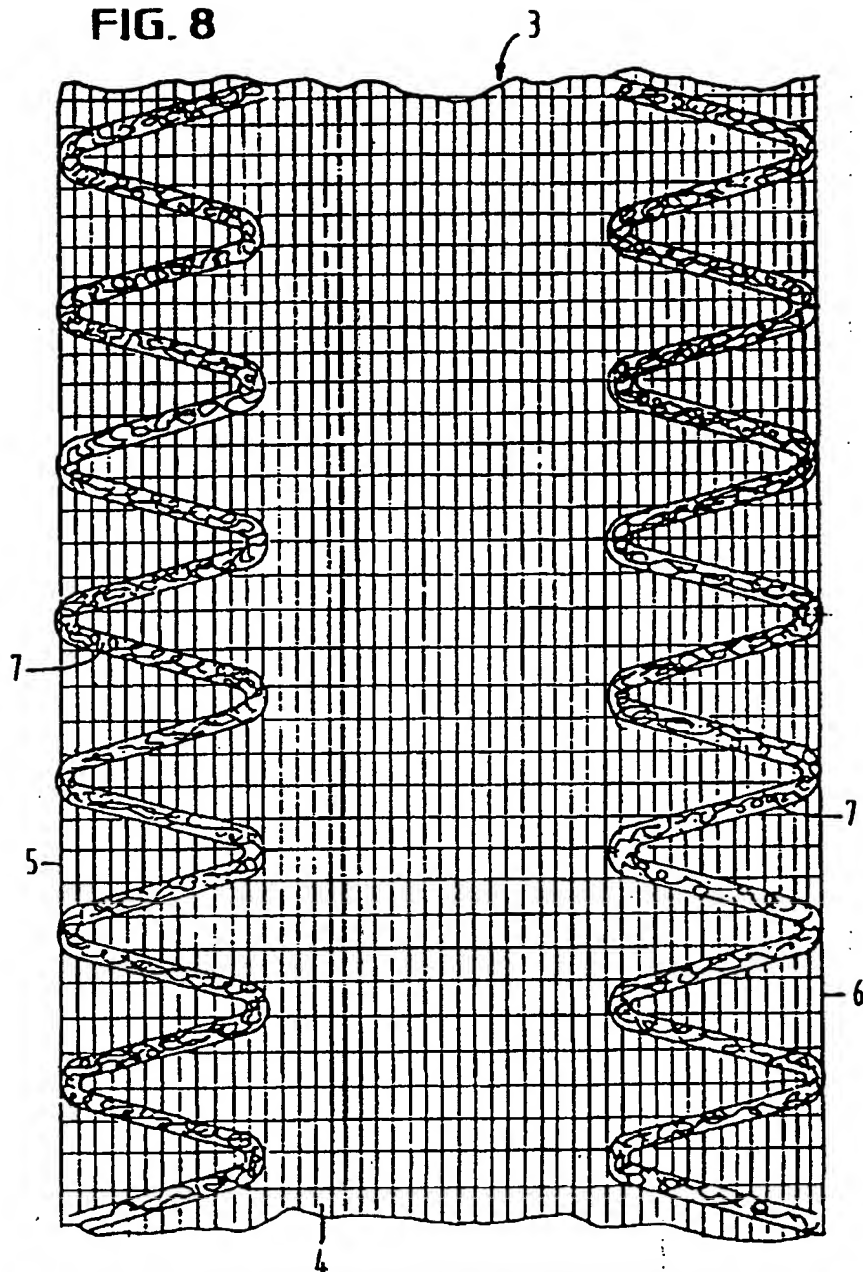
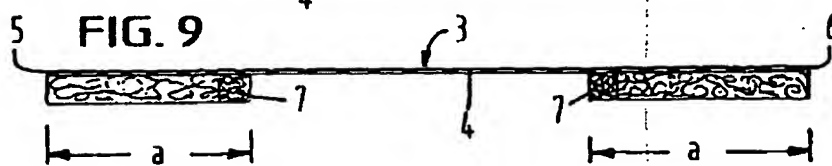
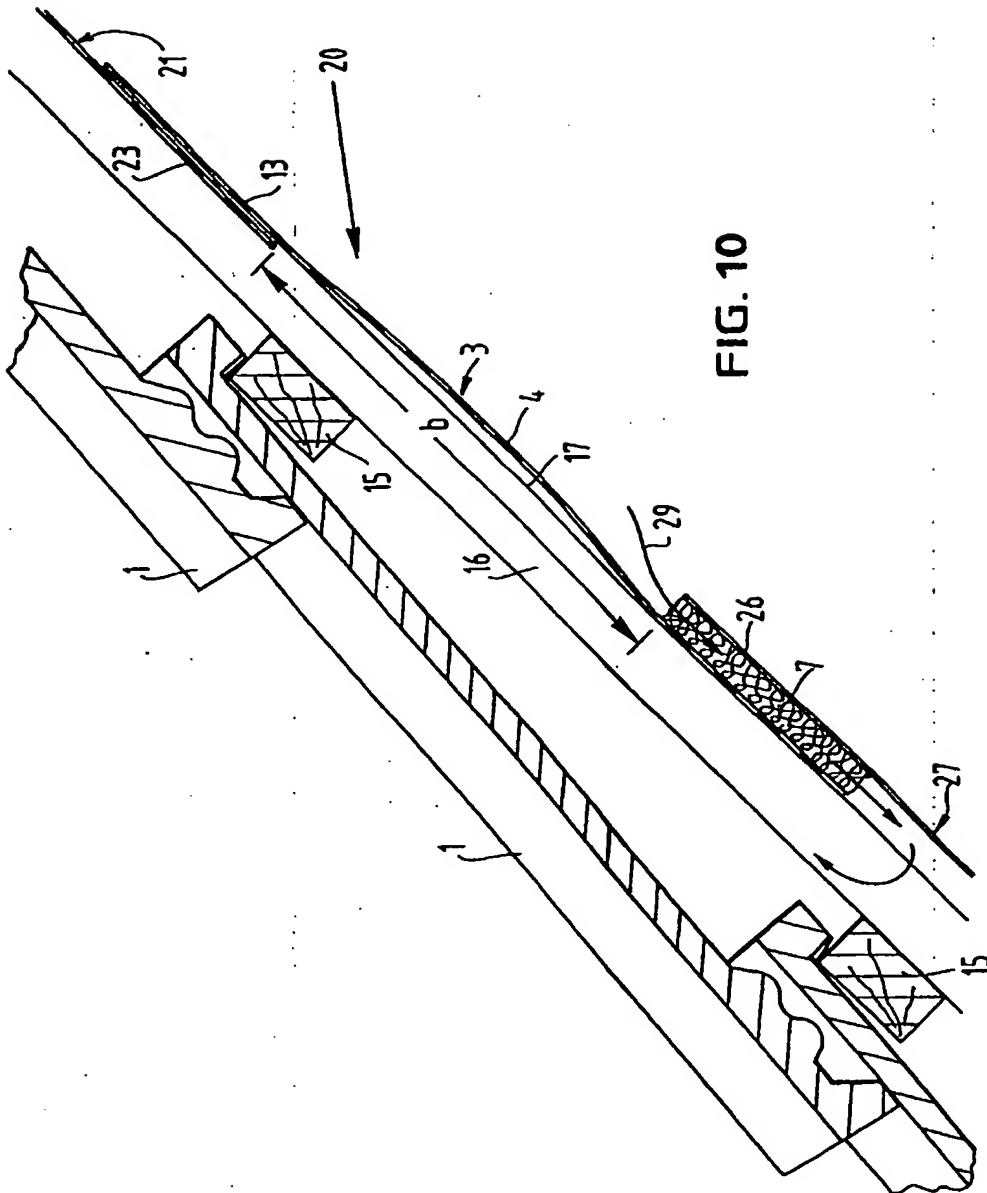


FIG. 9



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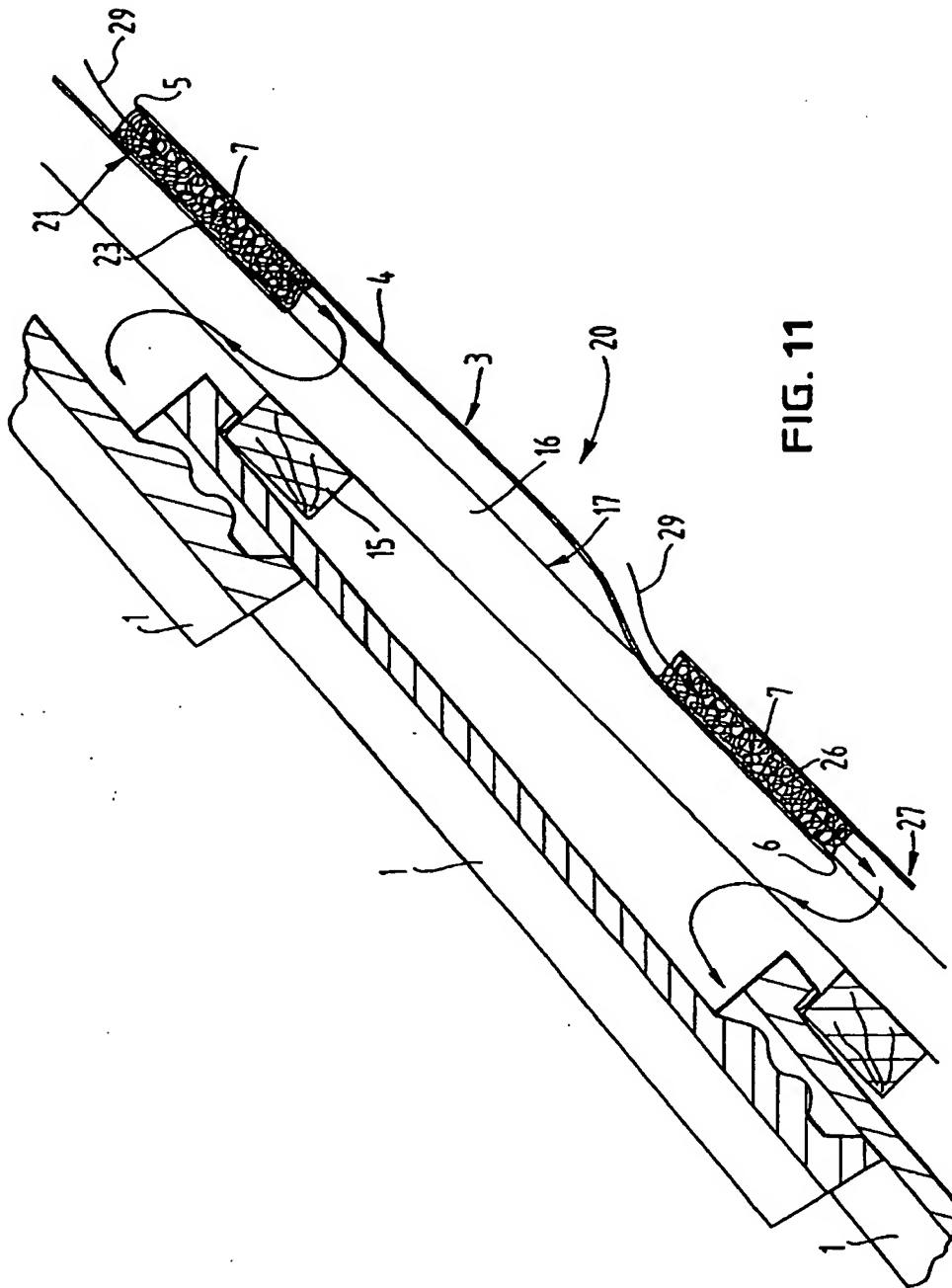


FIG. 11





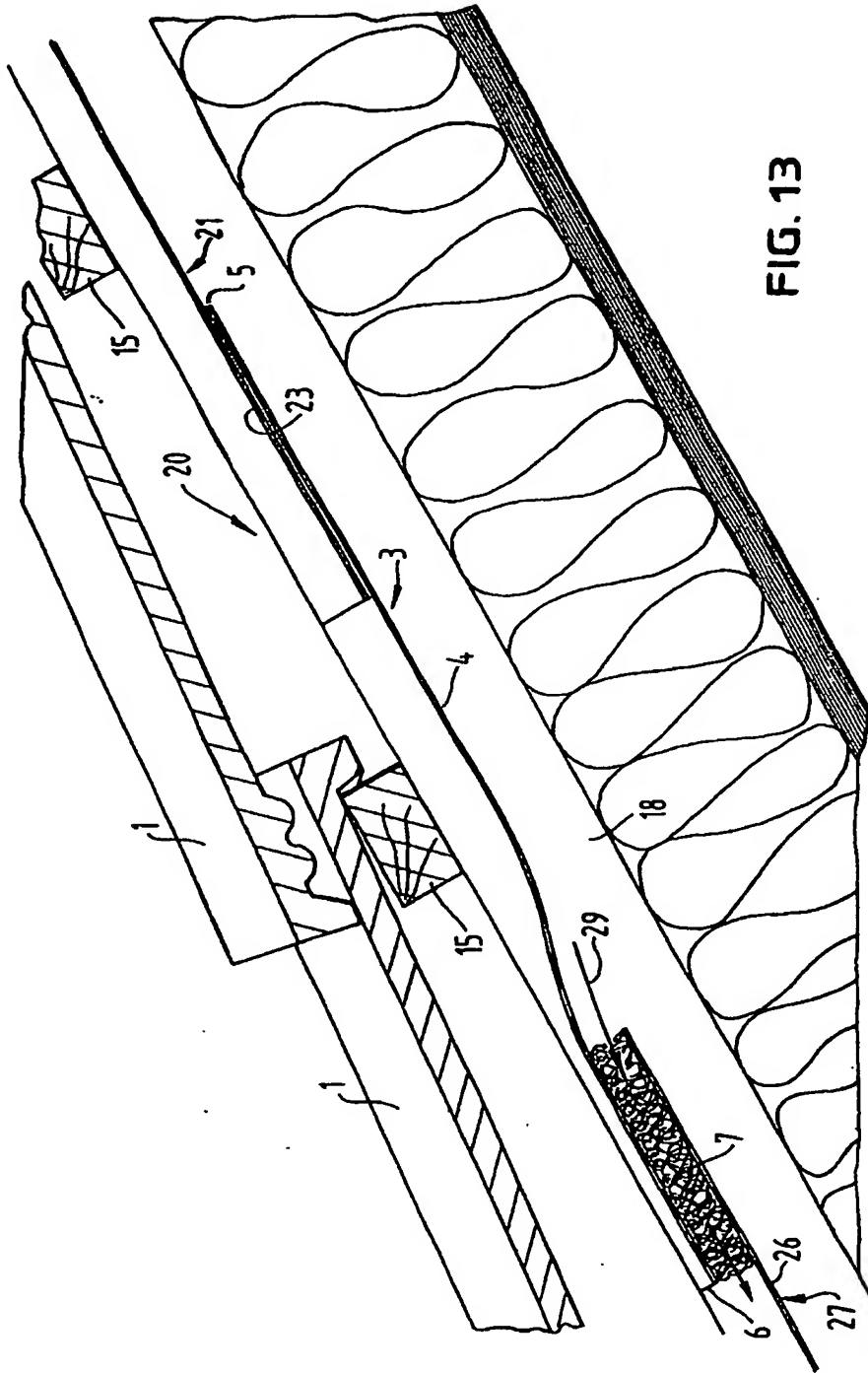


FIG. 13

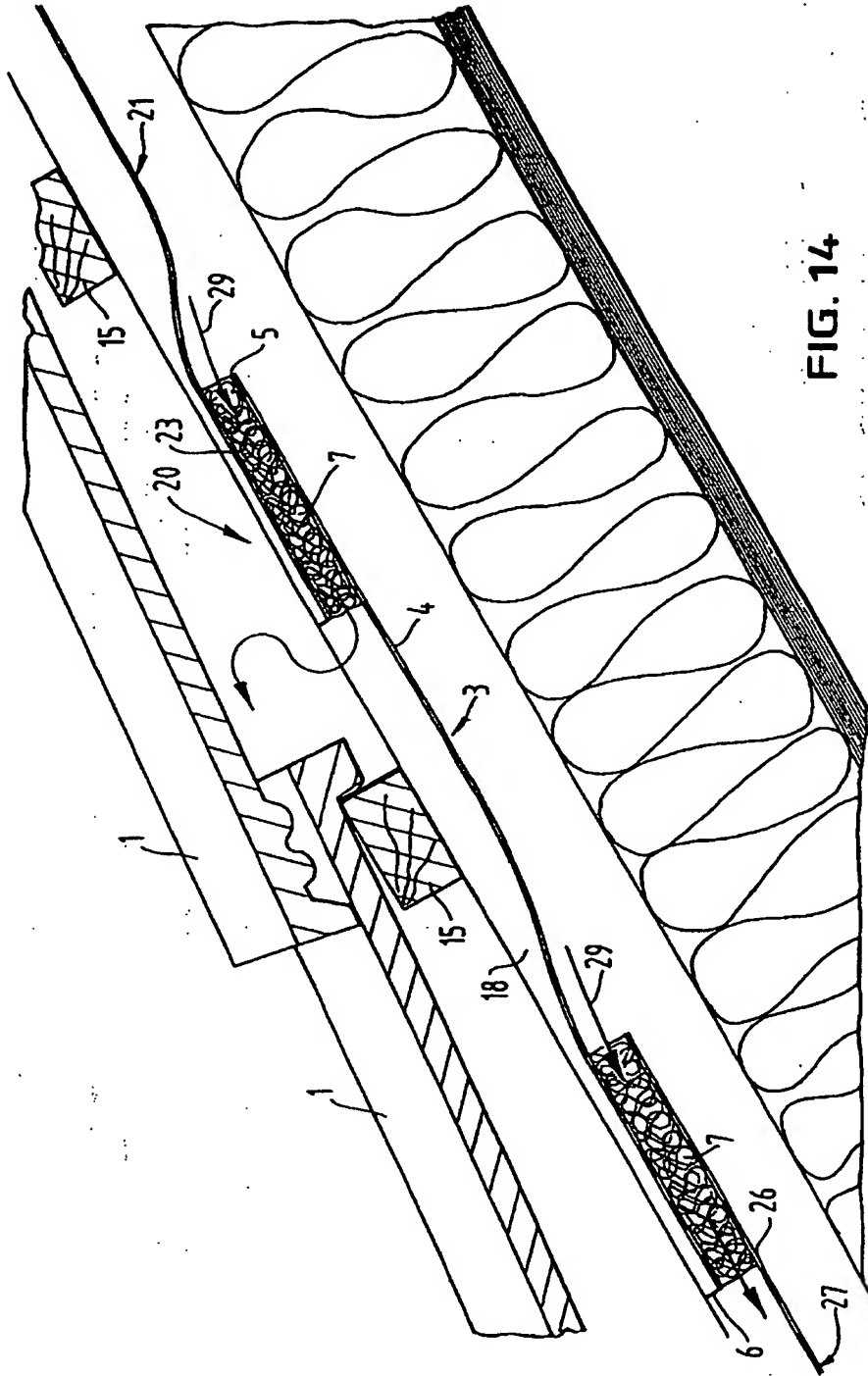


FIG. 14

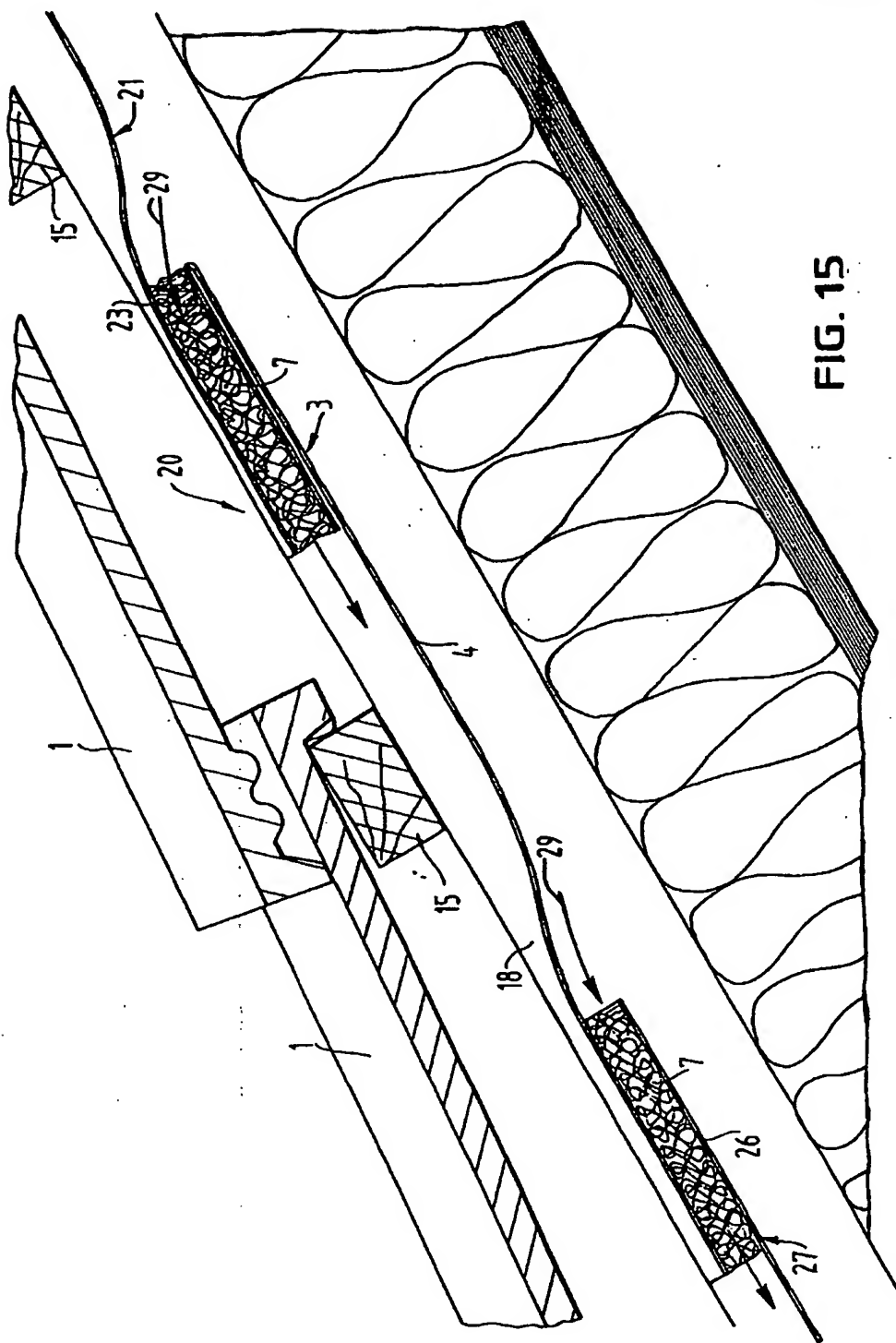


FIG. 15



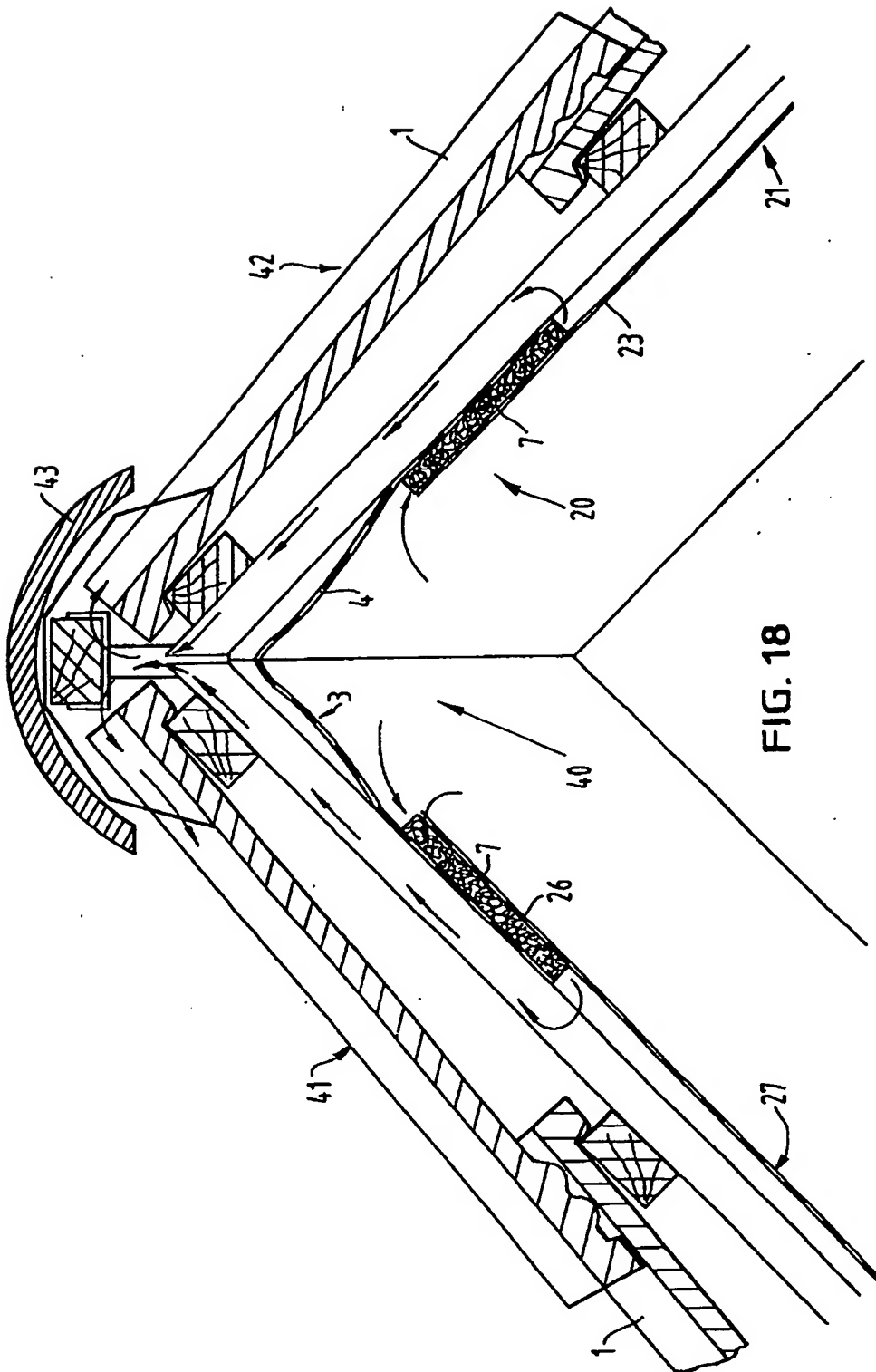


FIG. 18

FIG. 19

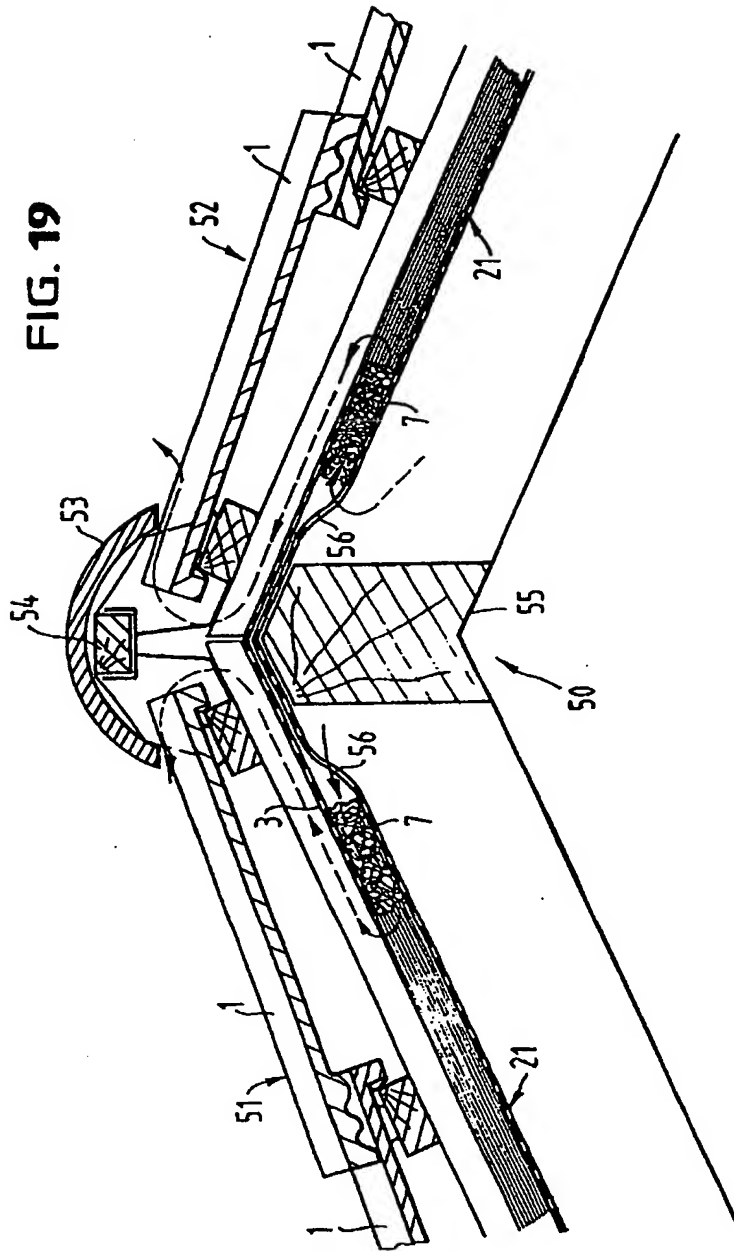
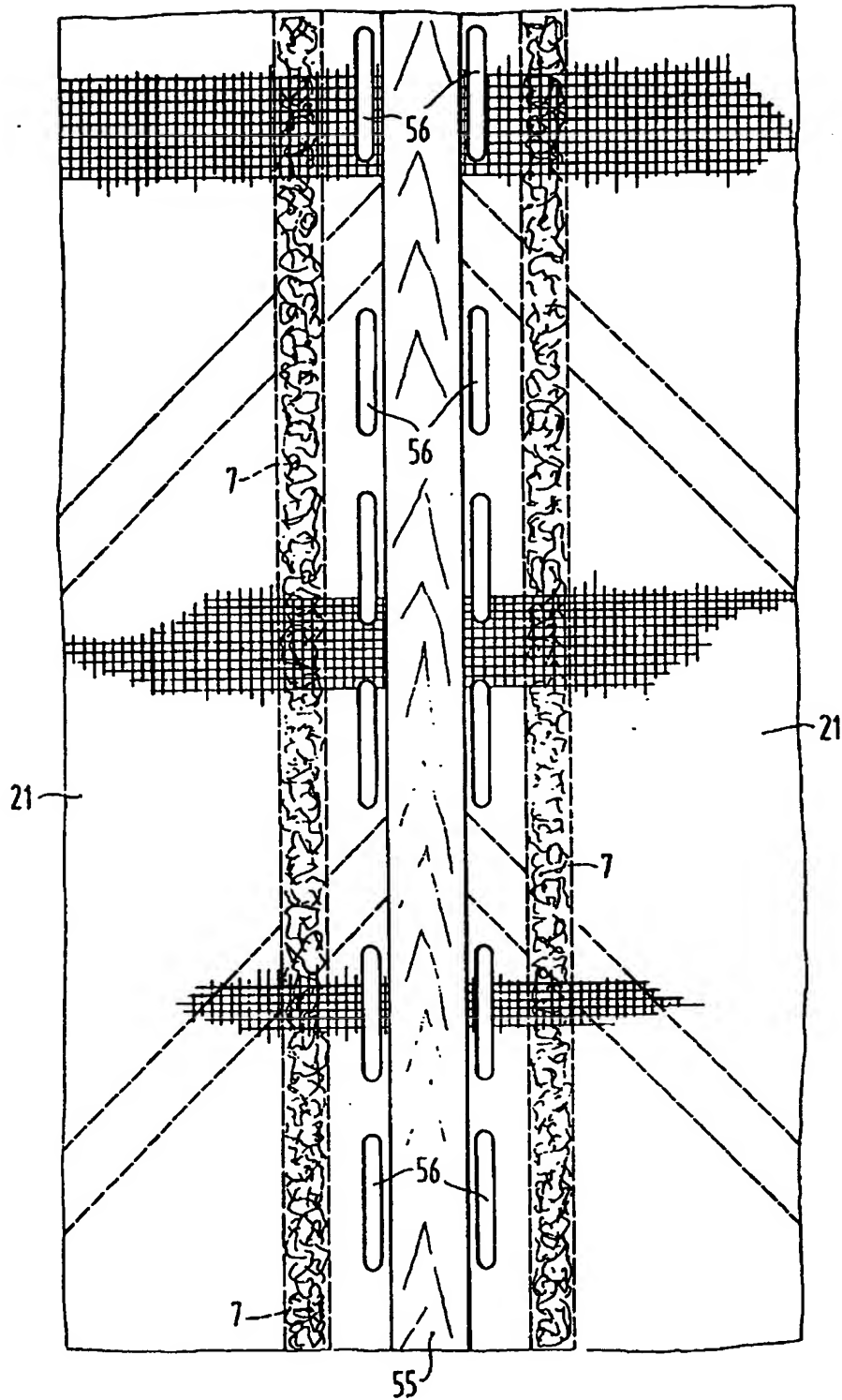
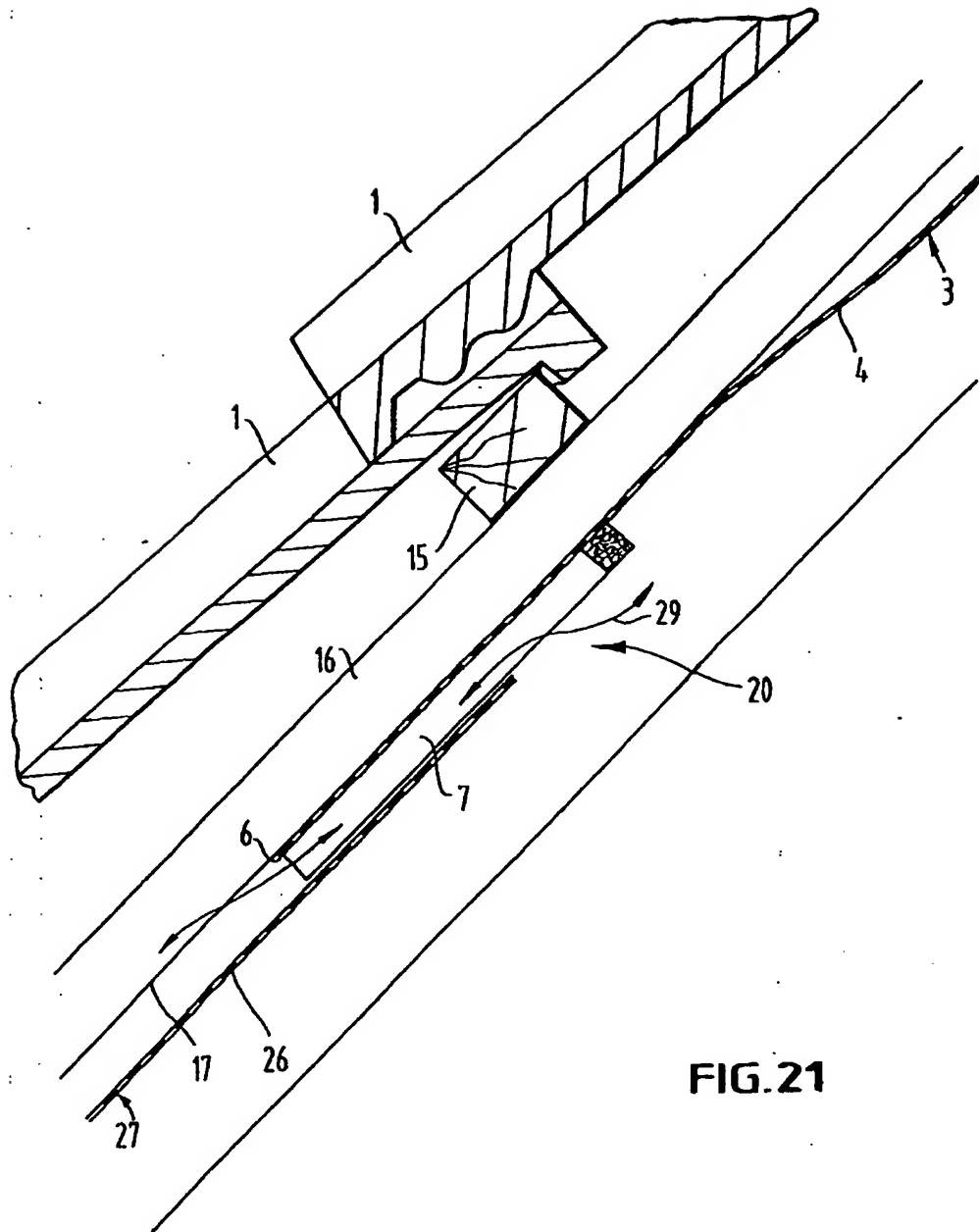


FIG. 20







## SPECIFICATION

## Roof lining for a sloping roof and a ventilating sheet for use therein

- 5 This invention relates to the construction of a ventilated lining or base skin for a sloping roof, and includes in addition to linings arranged beneath a normal roof surface and/or
- 10 in the eaves area, special arrangements for hip, ridge and/or valley areas between inclined roof surfaces. In particular the invention relates to a roof lining sheet (referred to herein after as an elongated or stretched ventilating
- 15 sheet) which incorporates a ventilation arrangement to provide ventilation between lining sheets which overlap with each other.
- A ventilated base skin beneath the roofing panels of a sloping roof is known from the
- 20 German Offenlegungsschrift 3,202,509. The known base skin consists of at least two base sheets, between which at least one ventilation element is located. The known arrangement provides for adjacent base sheets
- 25 to be laid in overlapping manner, with the ventilation elements being inserted between the two overlapping edge sections of two adjacent base sheets. The known ventilation element is designed as a spacer which is attached between two adjacent rafters. The
- 30 known spacer has a seating shoulder for the upper sheeting web and a bearing shoulder for the lower sheeting web. Both shoulders are connected to one another via a grid-shaped
- 35 wall section or the like on which a number of ventilation openings are recessed. Typically over and above the attachment of the base sheets to the understructure of the roof additional means and measures are required for
- 40 fixing the spacers. The known spacers can be attached only in the free space between adjacent rafters.
- German Patent Specification 706,051 relates to a seal made of silicate threads and arranged in seams, rabbets or connections of a
- 45 roof skin. This seal is to consist of an unsupported, plate-like or strip-like fibre-glass web (glass wadding). In addition, sealing means are mentioned in this document which are to have
- 50 a fibre-glass web of fine and curled glass fibres on a backing such as a jute, cardboard or paper base. Because of their typical dimensions, such previously known fibre-glass webs provided with a backing would not be suitable
- 55 as ventilation elements for base sheets nor inasmuch as is known here have they been proposed or used for this purpose.
- In accordance with the present invention there is provided a roof lining sheet for use in
- 60 producing a roof lining attached to a roof structure beneath the roofing panels of a sloping roof and having at least two sheet sections laid in overlapping manner, said sheet comprising an elongated strip of sheet material having permanently attached thereto in
- 65

the area of a longitudinal edge portion a band of a nonwoven, air permeable material, said band being arranged to serve as a spacer between said sheet and another sheet section laid in overlapping relationship therewith, whereby to provide for air ventilation through the roof lining.

- 70 A roof lining sheet of this form enables a ventilated roof lining or base skin to be incorporated in a sloping roof which, without additional means and measures to attach a ventilation device, the ventilation being obtained upon the attachment of the lining to the understructure of the roof.

- 80 The ventilation band may be of small dimensions enabling the lining to be positioned on the outside of the rafters and/or in the problem areas for example at the ridge, hip and/or a valley, and can ensure reliable air exchange in these areas.

- The invention also provides a ventilating roof lining sheet in a roof lining positioned beneath the roofing panels of a sloping roof, the lining including two base sheets generally
- 90 parallel to and spaced from one another, the ventilating sheet comprising an elongated strip of sheet material having permanently attached thereto in the area of one or both longitudinal edge portions a nonwoven, air permeable
- 95 band, the ventilating sheet covering the gap between the two base sheets with the band on one edge portion resting in overlapping manner against an edge section of one base sheet, and the other edge portion of the ventilating sheet or if provided the band thereon,
- 100 resting in overlapping manner against an edge section of the other base sheet located adjacent to said edge section of said one base sheet.

- A further aspect of the invention relates to the ventilating sheet itself which together with conventional base sheets results in the ventilated roof lining or base skin according to the invention. In so far as is possible and justifiable, protection is also claimed with the invention for this ventilating sheet itself of certain design.

- Certain embodiments of the invention are directed to the construction of a ventilated base skin beneath the roofing panels in the ridge, hip and/or valley area between inclined roof surfaces of a sloping roof.

- As already stated, a stretched ventilating sheet according to the invention essentially
- 120 consists of a strip of sheet which, in the area of one longitudinal margin or both longitudinal margins, bears (in each case) a permanently attached band consisting of a non-woven material permeable to air.

- The strip of stretched sheet can be made of conventional sheeting materials as are typically used for insulating and sealing roofs. The base sheets and the strip of stretched sheet can be made of different sheeting materials. A
- 130 stretched ventilating sheet of certain design

can therefore be made up into a ventilated base skin with various, conventional base sheets. On the other hand, it is also possible for the strip of stretched sheet to be made of the same sheeting material as the base sheet. In this case, recourse can be made to the successful sheeting materials for base sheets, and variable sheeting expansion under alternating thermal stresses and the like are avoided.

The band material (hereinafter termed "non-woven") must be permeable to air and can be made of conventional non-corroding fibre materials. Here, the most suitable materials are various synthetic fibres such as, for example, fibres of nylon, polyethylene, polyacrylic and/or polyester. Permanently curled fibres are preferably used in order to ensure a high permeability to air and a high stability of the nonwoven. In individual cases, fibres of inorganic materials and metal fibres may also be suitable.

The band consisting of the nonwoven permeable to air is permanently attached to the strip of stretched sheet in the area of one longitudinal margin or both longitudinal margins. It can be permanently attached by laminating, by adhesive means, by hot melting and other measures known in plastics technology such as heat sealing. Laminating has proved particularly successful and is preferably provided.

The strip of stretched sheet is primarily used as a retaining and backing for the band of nonwoven and has dimensions expediently adapted to this function. A strip of stretched sheet which has a width of about 40 to 60 cm, in particular about 50 cm, is well suited to most requirements. Such dimensions ensure that, when laid with a sag without counterbatens, the stretched ventilating sheet can be arranged such that the bands of nonwoven in each case lie in the centre between two roof battens and thus sufficient cross-section, which is not constricted by the roof batten, always remains above the base skin.

When laying the stretched ventilating sheet at the ridge, such a width of the strip of stretched sheet ensures that the ventilation opening at the ridge in each case comes to lie approximately in the centre between the last two roof battens. In hip ventilation, the recessed ventilation openings to the left and right of the hip rafter are adequately covered under these conditions, for example to a width of about 10 to 12 cm. When using the stretched ventilating sheet in the valley, an adequate water channel is available along the centre line under these conditions, and the strip of stretched sheet is adequately covered towards the side by the valley above it. In contrast, the width of typical base sheets is 150 cm. Moreover, the centre section of the strip of stretched sheet also acts as a flow-conducting member for the air flow through the non-woven.

On such a strip of stretched sheet, at least

one band of nonwoven is permanently attached which typically has an essentially rectangular cross-section. The width of the band cross-section can preferably be 8 to 15 cm, in particular about 10 to 12 cm; the thickness of the band cross-section can preferably be 8 to 20 mm, in particular about 10 to 15 mm.

So that a band of nonwoven having such dimensions ensures adequate air exchange, there must be a loose arrangement of fibres which is permeable to air. The free ventilation cross-section of the band of nonwoven is preferably to amount to at least 80% of the band cross-section. Especially preferred is a band of nonwoven whose free ventilation cross-section amounts to 90% and more of the band cross-section. On the other hand, the nonwoven is to be sufficiently rigid and durable so that it is not compressed to any significant extent under the conditions to be expected. With such dimensions and such air permeability of the band of nonwoven, a ventilation cross-section at the ridge and at the hip of at least 0.05 per cent of the roof surface can readily be achieved for all normal rafter lengths.

The band of nonwoven can have two parallel, essentially straight longitudinal edges. Alternatively, one band edge can be made straight and the other, opposite band edge can be made corrugated. Such an embodiment enables material to be saved in the nonwoven, because the maximum bandwidth is only reached in the area of the corrugated ridges; here the bandwidth can be, for example, 8 to 15 cm and especially preferred 10 to 12 cm. In the area of the corrugated valleys, a bandwidth of about 3 to 4 cm is completely adequate.

For many cases, it is sufficient for simply one band of nonwoven to be permanently attached to the marginal area of one side of the strip of stretched sheet, in particular laminated on. For other purposes, in particular for insulating the roof in the ridge, hip and valley area, such stretched ventilating sheets are suitable in which a band of nonwoven is attached to a strip of stretched sheet in each of the two longitudinal marginal areas. If two bands of nonwoven are attached to a strip of stretched sheet, they can be attached on the same side or on opposite sides (upper side and underside) of the strip of stretched sheet. Because of the wide range of uses, the arrangement of two bands of nonwoven is preferably provided on one side of a strip of stretched sheet.

A band of nonwoven in the marginal area of the strip of stretched sheet can be arranged parallel to the longitudinal margin or in a zig-zag shape in the marginal area or the like, as is explained in detail below.

It is also not necessary to attach a continuous, practically endless band of nonwoven in the marginal area of the strip of stretched sheet. On the contrary, the band of nonwoven

can be divided into individual band sections which are arranged in alignment with one another and at a distance from one another. Such an arrangement is especially expedient if the ventilated base skin is to be attached to the outside of the roof rafters, so that the individual band sections of nonwoven come to lie between the roof rafters. In such a case, the length of the individual band sections and the distance between adjacent band sections can be adapted to the typical dimensions of the roof rafters and their spacing in a typical roof understructure.

The finished stretched ventilating sheet typically has a width of about 40 to 60 cm, in particular about 50 cm, and, at least in the area of one longitudinal margin, has a permanently attached band of nonwoven which is permeable to air. Such a stretched ventilating sheet is supplied with a practically "endless" length in the form of a rolled coil. Depending on the thickness of the band of nonwoven, a length of about 30 to 50 m has proved successful in practice and is preferably provided.

A base skin consisting of several base sheets is especially simple to ventilate with such a stretched ventilating sheet. The stretched ventilating sheet is laid together with the base sheets and this requires no additional means and/or measures. In the simplest case, two base sheets are laid at a distance from one another across the roof slope in such a way that a gap or interspace of about 20 to 30 cm remains between the base sheet margins arranged opposite one another in the same plane. A stretched ventilating sheet equipped with only one band of nonwoven is arranged in such a way that the band of nonwoven comes to lie beneath the marginal section of the base sheet closer to the ridge, rests here directly against the underside of the base sheet and is covered by the latter. The stretched-sheet strip of the stretched ventilating sheet covers the gap between the two base sheets and overlaps with the top-end marginal section of the base sheet further away from the ridge. The individual sheeting sections overlap rooflike adjacent to the underside of the roof panels and ensure that water is led off to the eaves. The band of nonwoven arranged between a base sheet and the strip of stretched sheet ensures a largely open ventilation cross-section essentially over the entire length of the base sheet, through which ventilation cross-section adequate air exchange is possible even if the band thickness is comparatively small.

It is not necessary to provide a stretched ventilating sheet adjacent to each base sheet. On a base skin extending from the eaves up to the ridge, a stretched ventilating sheet is preferably provided in each case at least in the eaves area and in the ridge area in order to ensure adequate air circulation between the inner space of the roof and the space beneath

the roofing panels.

The invention is described in greater detail below with reference to preferred embodiments and to the drawings, in which:

- 70 *Figure 1* shows a plan view of a detail of a stretched ventilating sheet according to the invention having a band of nonwoven along a longitudinal margin of the strip of stretched sheet;
- 75 *Figure 2* shows a section through the stretched ventilating sheet according to Fig. 1; *Figure 3* shows a section through an alternative stretched ventilating sheet in which a band of nonwoven is located in each case on the upper side and on the underside of the strip of stretched sheet;
- 80 *Figures 4 and 5* show, respectively, a plan view and sectional representation of a detail of an alternative stretched ventilating sheet, in which two bands of nonwoven are located on the same side of the strip of stretched sheet;
- 85 *Figure 6* shows a plan view of a detail of a further stretched ventilating sheet, the bands of nonwoven of which have a corrugated margin;
- 90 *Figure 7* shows a plan view of a detail of a basic material for the bands of nonwoven of the stretched ventilating sheet according to Fig. 6;
- 95 *Figures 8 and 9* show, respectively, a plan view and a sectional representation of a detail of a further stretched ventilating sheet with a zigzagged arrangement of the bands of nonwoven;
- 100 *Figure 10, 11 and 12* each show a schematic sectional representation of the details of various embodiments of an inventive, ventilated base skin which is attached beneath the roofing panels of a sloping roof to the inside of counterbattens fastened to the rafters;
- 105 *Figures 13, 14 and 15* show largely analogous sectional views of details of various embodiments of an inventive, ventilated base skin which is attached beneath the roofing panels of a sloping roof to the outside of the rafters;
- 110 *Figures 16 and 17* show schematic sectional views of a detail of an inventive, ventilated base skin in the valley area between two sloping roof surfaces;
- 115 *Figure 18* shows a schematic sectional view of a detail of an inventive, ventilated base skin in the ridge area;
- 120 *Figure 19* shows a sectional view of a detail of an inventive, ventilated base skin in the hip area;
- 125 *Figure 20* shows a schematic plan view of the base skin according to Fig. 19, and *Figure 21* shows a schematic sectional representation of a detail of an inventive ventilated base skin with a stretched ventilating sheet according to Figs. 8 and 9 beneath the roofing panels of a sloping roof.
- 130 As shown in Figs. 1 and 2, an embodiment of a stretched ventilating sheet 3 according to

the invention consists of a strip 4 of stretched sheet and a band 7 of nonwoven which is arranged along a longitudinal edge 5 or 6 of the strip 4 of stretched sheet. Alternatively, a band 7 of nonwoven can be attached to a strip 4 of stretched sheet parallel to each longitudinal edge 5 and 6 (cf. Figs. 3, 4, 5, 8 and 9).

Each band 7 of nonwoven consists of filaments and fibres, in particular curled fibres, which are intertwined and if necessary heat-sealed in wide loops, and ensures, as a result of this material configuration, a free ventilation cross-section of at least 80%, and preferably 90% and more, of the band cross-section in the installed position. The filaments of the nonwoven can be made of a plastic such as nylon or the like, and if necessary also of metal and other inorganic materials. The bands of nonwoven are as mechanically strong as possible.

Each band 7 of nonwoven is permanently attached in the longitudinal marginal area of a strip 4 of stretched sheet, for example by laminating, bonding, heat sealing, melting or the like.

The strip 4 of stretched sheet can be manufactured from conventional sheeting materials and preferably consists of typical sheeting of base sheet and is of the thickness of this sheeting. The strip 4 of stretched sheet primarily serves as a backing or as a retaining member for the band 7 of nonwoven. In addition, the strip 4 of stretched sheet, with its centre section "b", covers a usually existing gap between two adjacent base sheets and in the installed position forms a flow-conducting member for the airflow for ventilating the roof space. In the installed position, with the two marginal sections, each of width "a", the strip 4 of stretched sheet overlaps with the adjacent marginal section of each adjacent base sheet.

The width of a strip 4 of stretched sheet is preferably about 40 to 60 cm; in an exemplary, particularly preferred embodiment, the strip 4 of stretched sheet has a width of about 50 cm. The band 7 of nonwoven preferably has a width "a" of 8 to 15 cm, in particular about 10 to 12 cm. Completely adequate air circulation can be achieved when the band 7 of nonwoven is about 8 to 20 mm thick, and in particular preferably about 10 to 15 mm thick.

The stretched ventilating sheet 3 shown in Figs. 1 and 2 has only one band 7 of nonwoven which is permanently attached to the strip 4 of stretched sheet, in particular by laminating, parallel to the right-hand margin 6.

The stretched ventilating sheet 3 shown in Fig. 3 has two bands 7 of nonwoven, of which one is attached parallel to the right-hand margin 6 on the upper side of the strip 4 of stretched sheet, whereas the other band 7 of nonwoven is attached parallel to the left-

hand margin 5 on the underside of the strip 4 of stretched sheet. Both bands 7 of nonwoven have the same width "a".

In a different embodiment, in the stretched ventilating sheet 3 shown in Figs. 4 and 5, both bands 7 of nonwoven are located on the upper side of the strip 4 of stretched sheet. Such an embodiment is especially expedient for ventilating a roof skin in the ridge, hip and/or valley area.

In the stretched ventilating sheet 3 shown in Fig. 6, two bands 7 of nonwoven are likewise attached to the upper side of a strip 4 of stretched sheet. In this different embodiment, each band 7 of nonwoven has a straight longitudinal edge 8 and an opposite corrugated longitudinal edge 9. Such a band of nonwoven with a corrugated longitudinal edge 9 can be obtained, for example, by cutting up a nonwoven of appropriate width which has two parallel straight longitudinal edges 8, as indicated schematically in Fig. 7, into two halves along a corrugation line 8 essentially running in the centre. Such an embodiment saves material in the nonwoven, because the maximum width "a" is only reached in the area of the corrugation ridges 11. In the area of the corrugation valleys 12, the width of such a band 7 of nonwoven can be about 3 to 4 cm. In the stretched ventilating sheet 3 shown in Figs. 8 and 9, even more material is saved in the nonwoven. Here, a relatively narrow, for example only about 2 to 3 cm wide, band 7 of nonwoven is laminated on a strip 4 of stretched sheet essentially in a zigzag shape in the area of the two longitudinal edges 5 and 6. The amplitude of the zigzagged pattern here corresponds to the width "a" of about 8 to 15 cm and preferably about 10 to 12 cm.

One or the other embodiment of the stretched ventilating sheet 3 described above acts as a ventilation device for producing an inventive, ventilated base skin beneath the roofing panels on a sloping roof, as explained below in greater detail with reference to Figs. 10 to 21. Conventional base sheets 21 and 27 which are laid together with at least one stretched ventilating sheet 3 according to the invention are used for producing the finished, ventilated base skin 20 fixed on the understructure of a sloping roof. One band 7 of nonwoven or both bands 7 of nonwoven of a stretched ventilating sheet 3 according to the invention provide for adequate ventilation of the roof space beneath the roofing panels 1 and create a "ventilated" base skin 20. The material and the layer thickness of the stretched-sheet strip 4 of a stretched ventilating sheet 3 according to the invention preferably correspond to the material and the layer thickness of a conventional base sheet 21 and 27. A typical commercially available base sheet 21 consists of flame-resistant, tear-resistant, breathable sheeting of high-grade material (wall thickness about 130  $\mu$ m, weight

per unit area about 230 g/m<sup>2</sup>) which is supplied in a width of 150 cm and a length of 50 m—rolled in a coil.

In accordance with the typical, conventional method of laying, two adjacent base sheets are laid, beginning at the eaves, in overlapping manner across the slope of the roof. A spacer which is permeable to air can be arranged inside the overlapped area, as described in German Offenlegungsschrift 3,202,509 mentioned at the beginning. In contrast, adjacent base sheets are laid at a distance from one another according to the invention, so that an interspace or a gap remains between the lower edge 22 on the bottom-end marginal section 23 of a base sheet 21 closer to the ridge and the upper edge 25 on the top-end marginal section 26 of an adjacent base sheet 27 further away from the ridge. On the completely laid base sheet 20, this gap or interspace is covered by the centre section "b" of the stretched-sheet strip 4 of a stretched ventilating sheet 3 according to the invention. Various possibilities are available when selecting and arranging such a stretched ventilating sheet, as explained below in greater detail.

Fig. 10 shows a detail of a roof surface of a sloping roof in combination with a base skin according to the invention. The detail of the roof surface shown can be in the area of the normal roof surface or in the eaves area. The roofing panels 1 rest on roof battens 15 which are fixed to rafters (not shown). Fastened to these rafters are counterbattens 16, to the underside 17 of which the ventilated base skin 20 is attached. This base skin 20 consists of stretched ventilating sheets 3 according to the invention and conventional base sheets, of which only the bottom-end marginal section 23 of a base sheet 21 closer to the ridge and the top-end marginal section 26, arranged at a distance from the marginal section 23, of an adjacent base sheet 27 further away from the ridge can be seen in the detail shown. The band 7 of nonwoven on the stretched ventilating sheet 3 according to the invention overlaps with the top-end marginal section 26 of the base sheet 27 further away from the ridge and rests directly against its underside. A centre section "b" of the stretched-sheet strip 4 of the stretched ventilating sheet 3 covers the gap between the two base sheets 21 and 27 and acts as a flow-conducting member for the airflow through the nonwoven. A top-end marginal section 13 of the strip 4 of stretched sheet overlaps with the bottom-end marginal section 23 of the base sheet 21 closer to the ridge and rests against the underside of the marginal section 23. This results overall in a roof like arrangement of all sheet sections, on the upper side of which water can run off until it is collected in the eaves area. The inner space of the roof beneath the base skin 20 is ventilated towards the roofing panels 1 in the di-

rection of arrows 29 through the band 7 of nonwoven of the stretched ventilating sheet 3 according to the invention. Air exchange takes place virtually unimpaired because of the free ventilation cross-section of a band 7 of nonwoven, which ventilation cross-section is at least 80% and preferably 90% and more of the band cross-section. Full ventilation then takes place via free spaces between the individual roofing panels 1 and/or via ventilation cross-sections (not shown) of special ventilation roof tiles or ventilation pipes.

Fig. 11 shows an essentially analogous arrangement of a ventilated base skin 20 beneath the roofing panels 1 of a sloping roof. This arrangement differs in that such a stretched ventilating sheet 3, which has a band 7 of nonwoven in the area of each longitudinal margin 5 and 6, covers the gap between the top-end marginal section 26 of a base sheet 27 further away from the ridge and the bottom-end marginal section 23 of a base sheet 21 closer to the ridge. In the representation, the top-end band 7 of nonwoven is located on the upper side and the bottom-end band 7 of nonwoven is located on the underside of the stretched-sheet strip 4 of a stretched ventilating sheet 3 according to the invention. For ventilating the roof, air exchange takes place through both bands 7 of nonwoven, as indicated by arrows 29.

Fig. 12 shows a further alternative of an inventive, ventilated base skin 20 beneath the roofing panels 1 of a sloping roof. Here, such a stretched ventilating sheet 3, in which a band 7 of nonwoven is located on the same side of a strip 4 of stretched sheet in each marginal area 5 and 6, bridges an intermediate space between the top-end marginal section 26 of a base sheet 27 further away from the ridge and the bottom-end marginal section 23 of a base sheet 21 closer to the ridge. As shown, the strip 4 of stretched sheet is folded over adjacent to the top-end band 7 of nonwoven in order to ensure an arrangement in which both bands 7 of nonwoven help to ventilate the roof space and rest directly against the marginal section 23 and 26 of the adjacent base sheet 21 and 27 respectively.

Figs. 13, 14 and 15, which are largely identical, show embodiments, made essentially analogous, of a ventilated base skin 20 beneath the roofing panels 1 of a sloping roof. Here, the difference is that the base skin 20 is attached to the outside of rafters 18 which support the roof battens 15 on which the roofing panels 1 rest in turn. The base skin 20 consisting of conventional base sheets 21 and 27 as well as at least one stretched ventilating sheet 3 according to the invention can sag slightly between adjacent rafters 18. A stretched ventilating sheet 3 whose band or bands 7 of nonwoven consist(s) of individual sections of nonwoven which are arranged at a distance from one another and in alignment



with one another is to be recommended for attaching to the outside of the rafters 18. The arrangement and dimensions of the individual sections of nonwoven can be adapted to the typical arrangement and dimensions of rafters 18 in such a way that a rafter can just fill the gap between the adjacent sections of nonwoven.

Moreover, the selection and arrangement of the respective stretched ventilating sheet 3 for realising the respective embodiment, shown in Figs. 13, 14 and 15, of an inventive, ventilated base skin 20 beneath the roofing panels 1 of a sloping roof corresponds to the analogous embodiments shown in Figs. 10, 11 and 12, so that reference is made to the description of these Figures for further details.

Figs. 16 and 17 show the schematic arrangement of an inventive, ventilated base skin 20 in the area of a roof valley 30 between two sloping-roof surfaces 31 and 32. A flashing 33 grips beneath the two lowermost rows of roofing panels 1 of the two sloping-roof surfaces 31 and 32 and acts as a water runoff channel. Located beneath sloping-roof surface 31 and 32 is at least one base sheet 21 and 27, the bottom-end marginal sections 23 and 26 respectively of which end beneath the flashing 33. The remaining gap between the two margins of the base sheets 21 and 25 is covered by a stretched ventilating sheet 3 according to the invention which has a band 7 of nonwoven in each marginal area, both of which bands 7 of nonwoven are attached on the same side of a strip 4 of stretched sheet. The bands 7 of nonwoven in each case rest against the underside of the bottom-end marginal sections 23 and 26 respectively of the base sheets 21 and 27 adjacent to the valley, thus ensuring a roof-like water runoff towards the strip 4 of stretched sheet folded like a valley. This strip 4 of stretched sheet, arranged and aligned essentially parallel to and at a distance from the flashing 33, forms a further water runoff channel 35 via which condensation or water which collects for example from leaks in the outer roofing or the valley can be carried off.

In the representation according to Fig. 17, the strip 4 of stretched sheet is folded over adjacent to each band 7 of nonwoven.

Fig. 18 shows the schematic arrangement of an inventive, ventilated base skin 20 in the area of a ridge 40 between two sloping-roof surfaces 41 and 42. The roofing panels 1 of each sloping-roof surfaces 41 and 42, which roofing panels 1 directly adjoin the ridge 40, are covered by conventional ridge caps 43 which are fixed by means of known devices to a ridge board 44. Beneath each sloping-roof surface 41 and 42 a base sheet 21 and 27 is located, of which only the respective top-end marginal section 23 and 26 to the left and right of the ridge 40 can be seen in the representation. The gap is covered with a

stretched ventilating sheet 13 according to the invention which has a band 7 of nonwoven in the area of each longitudinal margin, each of which bands 7 of nonwoven is attached on:

the same side of the strip 4 of stretched sheet. As shown, each band 7 of nonwoven rests against the outside of the top-end marginal section 23 and 26 of each base sheet 21 and 27 respectively adjacent to the ridge. The section of the strip 4 of stretched sheet, which section remains between the two bands 7 of nonwoven, is fastened roof-like to the understructure of the roof and, in addition to providing a seal, ensures that spent air is directed towards the inlet areas of the two bands 7 of nonwoven, so that an airflow, indicated by the arrows is ensured for ventilating the roof in the ridge area.

Figures 19 and 20 show the space insulation and the ventilation in the hip area with the use of a stretched ventilating sheet according to the invention. In the hip area 50, the roofing panels 1 of the two sloping-roof surfaces 51 and 52 are covered by conventional ridge or hip elements 53 which are fastened by means of known devices to a ridge or hip board 54. In this case, a conventional base sheet 21 is laid continuously from one roof surface 51 to the other roof surface 52 and grips over a hip beam 55 on the outside. For ventilation, ventilation holes 56 are recessed on the base sheet 21 on both sides along the hip beam 54. The arrangement of these ventilation holes 56 can be seen in particular from the schematic plan view according to Fig. 20.

Within the scope of the present invention, this base sheet 21 is completely covered on the outside in the hip area 50 by a stretched ventilating sheet 3 according to the invention which has a band 7 of nonwoven on each longitudinal margin. As can be seen from Fig. 19, such an arrangement is provided in which the bands 7 of nonwoven beneath the ventilation holes 56 rest directly against the upper side of the base sheet 21. This arrangement practically prevents water from penetrating into the roof space. For ventilating the roof, the air flows from the inner space of the roof through the ventilation holes 56 and then through the bands 7 of nonwoven, as indicated schematically by the arrows.

Fig. 21 shows ventilation insulation with a base skin 20 beneath the roofing panels 1 of a sloping roof, which roof insulation essentially corresponds to the roof insulation according to Fig. 12. The difference here is that an inventive stretched ventilating sheet 3 according to Figs. 8 and 9 acts as the ventilation element, the bands of nonwoven of which consists of the relatively narrow band of nonwoven arranged in a zigzag shape in the marginal area of the strip 4 of stretched sheet. As shown, the top-end marginal section 26 of the base sheet 27 further away from the ridge

does not fully overlap a marginal area of width "a" corresponding to the amplitude of the zig-zag arrangement. Air exchange is possible not only through the nonwoven but also through the gaps between the individual legs of the zigzagged arrangement of the nonwoven, provided the latter does not abut against the top-end marginal section 26 of the base sheet 27, as indicated schematically by the arrow 29.

#### CLAIMS

1. A roof lining sheet for use in producing a roof lining attached to a roof structure beneath the roofing panels of a sloping roof and having at least two sheet sections laid in overlapping manner, said sheet comprising an elongated strip of sheet material having permanently attached thereto in the area of a longitudinal edge portion a band of a non-woven, air permeable material, said band being arranged to serve as a spacer between said sheet and another sheet section laid in overlapping relationship therewith, whereby to provide for air ventilation through the roof lining.

2. A ventilating roof lining sheet in a roof lining positioned beneath the roofing panels of a sloping roof, the lining including two base sheets generally parallel to and spaced from one another, the ventilating sheet comprising an elongated strip of sheet material having permanently attached thereto in the area of one or both longitudinal edge portions a non-woven, air permeable band, the ventilating sheet covering the gap between the two base sheets with the band on one edge portion resting in overlapping manner against an edge section of one base sheet, and the other edge portion of the ventilating sheet or if provided the band thereon, resting in overlapping manner against an edge section of the other base sheet located adjacent to said edge section of said one base sheet.

3. A roof lining sheet according to claim 1 or 2, wherein the or each band has a free ventilation cross-section of at least 80% of the band cross-section.

4. A roof lining sheet according to claim 3, wherein the free ventilation cross-section is 90% or more of the band cross-section.

5. A roof lining sheet according to any one of claims 1 to 4, wherein the strip of sheet material has a width of 40 to 60 cm.

6. A roof lining sheet according to any one of claims 1 to 5, wherein the or each band is of substantially rectangular cross-section with a width of 8 to 15 cm, 10 to 12 cm, and with a thickness of 8 to 20 mm.

7. A roof lining sheet according to claim 6, wherein the band cross-section has a width of 10 to 12 cm and/or a thickness of 8 to 20 cm.

8. A roof lining sheet according to any one of claims 1 to 7, wherein the or each band has a straight longitudinal edge and an oppo-

site, corrugated edge.

9. A roof lining sheet according to claim 7, wherein the band has a maximum width at the corrugated ridges of 8 to 15 cm.

10. A roof lining sheet according to claim 9, wherein the maximum width of the band is 10 to 12 cm.

11. A roof lining sheet according to any one of claims 1 to 10, wherein the band or at least one of the bands consists of a number of band sections arranged in alignment with one another and at a distance from one another.

12. A roof lining sheet according to any one of claims 1 to 11, wherein one band is fixed on the upper side of the strip of sheet material along one longitudinal edge thereof, and another band is fixed on the underside of the strip of sheet material along the other longitudinal edge.

13. A roof lining sheet according to any one of claims 1 to 11, wherein two bands are fixed on the same side of the strip of sheet material along the opposite longitudinal edges thereof, in the finished roof lining, the strip of sheet material being folded so that one band is located above and the other band is located below the main plane of the strip of sheet material.

14. A roof lining sheet according to any one of claims 1 to 13, wherein the strip of sheet material is made of the same material and has the same layer thickness as a base sheet laid in overlapping relationship with said sheet.

15. A ventilated roof lining positioned beneath the roofing panels of a sloping roof, the lining including two sections of base sheet, which are laid in overlapping manner, one base sheet section being provided by a lining sheet as defined in claim 1 or any one of claims 3 to 11 when dependent on claim 1, and the band of said lining sheet forming a spacer between the base sheet sections.

16. A ventilated roof lining positioned beneath the roofing panels of a sloping roof, the lining including two base sheets arranged at a distance from one another, the gap remaining between the two base sheets being covered by a roof lining sheet according to any one of claims 1 to 14, with the band of said sheet overlapping with an edge section of one base sheet and the strip of sheet material overlapping an edge section of the other base sheet.

17. A roof lining sheet substantially as herein described with reference to Figs. 1 to 9 of the accompanying drawings.

18. A roof lining substantially as herein described with reference to Figs. 10 to 21 of the accompanying drawings.



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